




UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
75 Hawthorne Street  
San Francisco, CA 94105

September 14, 2000

**Memorandum**

**SUBJECT:** Response to National Remedy Review Board Memorandum for  
Lawrence Livermore National Laboratory Site 300

**TO:** Bruce Means, Chair  
National Remedy Review Board  
Office of Emergency and Remedial Response (5202G)

**From**  n Meer, Chief  
Federal Facilities Cleanup Branch, Superfund Division  
EPA Region IX

Thank you very much for your review and consideration of the proposed remedies for Lawrence Livermore National Laboratory (LLNL) Site 300. EPA Region 9 has reviewed and considered the comments of the National Remedy Review Board (NRRB) dated April 10, 2000. We have consulted with the U. S. Department of Energy (the lead agency for the site) to incorporate responses into the site decision documents. The NRRB memorandum was placed in the Administrative Record for the site, together with the attached responses provided by DOE.

Region 9 appreciates the NRRB's consultation and suggestions on the preferred alternatives. We look forward to working with you and the Region 1/9 Accelerated Response Center in EPA Headquarters in the future.

cc: Rafael Gonzalez, Region 1/9 Center

**U.S. Department of Energy Responses to the  
United States Environmental Protection Agency  
National Remedy Review Board (NRRB) Recommendations  
for  
Lawrence Livermore National Laboratory Site 300**

**NRRB Recommendation 1:**

Information presented to the board indicates that site contamination exceeds several ecological endpoint screening levels. It also identifies other ecological risks (e.g., from cadmium in operable unit 4 and Building 850). However, the materials did not clearly explain whether the site presents unacceptable ecological risks (i.e., ecological risks that warrant remedial action). The board recommends that the decision documents for this site clarify the bases for determining whether unacceptable ecological risks exist, and if so, demonstrate how the proposed actions address these risks.

***DOE Response:***

*DOE identified unacceptable ecological risks (where Hazard Indices [HIs] exceed 1), but LLNL biological surveys indicate there are no discernible impacts to wildlife populations. Based on this, the selected remedies include continued surveys and monitoring of ecologically significant media. The Proposed Plan and the Interim Site-Wide Record of Decision explain the rationale for determining ecological response actions.*

*The bases for determining ecological risk included: (1) calculating HIs for three terrestrial species representative of species important as either individuals (rare or endangered) or populations (more common species) for each localized area of contamination, (2) evaluating site-wide populations of those species important as populations, (3) calculating a Toxicity Quotient (TQ) for aquatic biota at springs and conducting follow-up bioassays, and (4) calculating HIs for vegetation at localized areas of contamination and evaluating plant diversity indices between contaminated and reference sites. The ecological assessment found HIs for some terrestrial species and TQs at some springs exceeded 1 at the Building 834, Pit 6 Landfill, High Explosives Process Area, and Building 850 Firing Table areas. Although individuals of some terrestrial species may be at risk in these areas, evaluation of site-wide terrestrial populations did not identify discernable impacts to overall populations at the site. In addition, no species important as individuals were actually present in the contaminated areas. Therefore, the DOE response action is to monitor contaminated areas to ensure rare terrestrial species (those important as individuals) are not found in areas where calculated HIs exceed 1, and to monitor site-wide biota to ensure species important at the population level remain unimpacted. Those springs at which the TQ exceeded 1 showed no adverse impact in the follow-up bioassays. The response action for the springs is to conduct future bioassays to ensure contaminants are not impacting aquatic biota. No adverse impacts were detected in the vegetation analysis, and no response is required.*

## **NRRB Recommendation 2:**

DOE has selected monitored natural attenuation (MNA) as its groundwater cleanup strategy for several locations at LLNL, based in large part on its belief that certain contaminated plumes are shrinking. The board recommends that DOE more fully support its MNA decisions in accordance with OSWER guidance (see OSWER Directive 9200-4-17P, Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites, April 21, 1999). This guidance identifies the kinds of data that should be considered when determining whether MNA is appropriate, including plume stability and evidence supporting specific attenuation mechanisms. For volatile organic compounds like those at LLNL, this could include biodegradation rates, environmental measures (DO, CO<sub>2</sub>, ethene/ethanes), etc.. DOE may also wish to consult EPA's Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water (EPA/600/R-98/128, 1998).

### ***DOE Response:***

*In preparing the Site-Wide Feasibility Study and Interim Site-Wide Record of Decision documents for LLNL Site 300, DOE consulted the above-referenced guidance, as well as "Decision-Making Framework Guide for the Evaluation and Selection of Monitored Natural Attenuation Remedies at DOE Sites," released by the DOE Office of Environmental Restoration in May 1999. The proposed MNA remedies at LLNL Site 300 will be consistent with the guidance contained in these documents, and DOE intends to collect all data appropriate to evaluate the effectiveness of MNA remedies at LLNL. DOE will present the details of the MNA evaluation programs in Remedial Design documents for individual areas of the site. Provisions for determining the effectiveness and protectiveness of MNA remedies will be included in the Site-Wide Contingency Plan for LLNL Site 300.*

*DOE selected MNA as a remedial technology for contaminants in two areas of Site 300: (1) tritium and volatile organic compounds (VOCs) in ground water released from the Pit 6 Landfill, and (2) tritium in ground water from the Building 850 Firing Table. In evaluating MNA for these areas, DOE:*

- 1. Demonstrated the occurrence and nature of natural attenuation processes,*
- 2. Assessed the ability of the natural attenuation mechanisms to reduce VOCs and tritium to concentrations protective of beneficial uses of ground water within a reasonable timeframe,*
- 3. Evaluated trends in the concentration and extent of VOCs and tritium in ground water,*
- 4. Considered the potential for future releases of VOCs and tritium from the source areas, and*
- 5. Estimated the potential for adverse impacts to human and ecological receptors under an MNA remedy.*

*Evaluation and consideration of this type of information is consistent with criteria specified in the above-referenced guidance documents when determining whether MNA is appropriate.*

### **NRRB Recommendation 3:**

In its initial review of the package, the board raised serious questions about the use of MNA at the Pit 7 Complex of OU5, where groundwater concentrations of tritium and uranium continue to increase (see site review package pp. 6-24, 6-25). The board supports the decision to remove the Pit 7 complex from this decision, pending further evaluation of the source and appropriate response options.

#### ***DOE Response:***

*DOE and the regulatory agencies have agreed to remove the Pit 7 Complex from the Proposed Plan and that additional site characterization and evaluation of remedial technologies will be conducted for the Pit 7 Complex. A focused area-specific Remedial Investigation/Feasibility Study (RI/FS) will be completed for the Pit 7 Complex. DOE is considering a number of source control measures for the Complex, including:*

- 1. Full or partial excavation of the landfill waste,*
- 2. In situ stabilization of the waste and/or adjacent soil using silica gel or ground freezing,*
- 3. Hydraulic control of underlying ground water,*
- 4. Removal of tritiated soil vapor and concentrating the tritium by isotopic fractionation, and*
- 5. Installation of a permeable reactive barrier (trench or wells) to control migration of depleted uranium in ground water.*

### **NRRB Recommendation 4:**

The overall remedy relies on previously constructed caps for source control at several pits and landfills to minimize leaching of contaminants to groundwater. However, the package does not describe the construction of these caps or their efficacy in reducing leachate migration. DOE should evaluate and document whether each cap (especially the non-RCRA Subtitle C caps) will, in fact, reduce leachate migration to levels that are consistent with the chosen remedy for that pit or landfill.

#### ***DOE Response:***

*DOE constructed non-engineered covers over the Pit 2, 8, and 9 Landfills in the 1960s and 1970s. These covers remain in place, and consist of 1 to 2 feet of uncompacted native soil. The covers are regularly inspected and maintained. There is no evidence of any impacts to ground water from these landfills. DOE does not rely on these covers to completely prevent infiltration of precipitation and subsequent leachate migration. The low annual precipitation at Site 300 (10 inches/year) is considerably less than the potential evapotranspiration (greater than 60 inches/year), and significant direct infiltration into the landfills is unlikely. Relatively thick vadose zones separate these three landfills from underlying ground water (depth to water is 40 to 165 feet), and there is no threat of ground*

*water rising into the landfills. The selected remedies for the Pit 2, 8, and 9 Landfills consist of installing enhanced vadose zone and ground water detection monitoring systems to allow early identification of any releases of contaminants from the landfills. If releases are detected, DOE will consider active source control measures. The details of the detection monitoring, inspection, and maintenance programs will be specified in Remedial Design documents for these landfills. DOE will include provisions for determining the effectiveness and protectiveness of the monitoring remedies for these landfills in the Site-Wide Contingency Plan for LLNL Site 300.*

*DOE constructed engineered caps over the Pit 1, 4, 6, and 7 Landfills and the High Explosives Burn Pits in accordance with RCRA regulations. Formal detection monitoring, inspection, and maintenance programs are in place to ensure that these caps will perform as designed to prevent infiltration of precipitation and any resultant leachate releases from the landfills.*

#### **NRRB Recommendation 5:**

The preferred alternative for the Building 850 area (OU5) calls for removing the contaminated sand pile and contaminated soil to levels consistent with the NCP's  $1 \times 10^{-6}$  point of departure for cancer risk (see NCP section 300.430(e)(2)(1)). Based on the site presentation, the board supports this action as cost effective, but notes that the preliminary remediation goals for the chemicals of concern should be better documented in the site's decision document.

#### ***DOE Response:***

*DOE has included concentration-based cleanup standards for tritium, PCBs, dioxins, and furans in surface and subsurface soil in the Interim Site-Wide Record of Decision. These standards are based on industrial or commercial preliminary remediation goals (PRGs) provided by EPA Region IX. EPA Region IX PRGs are risk-based tools for evaluating and remediating contaminated sites, and combine current EPA toxicity values with standard exposure factors to estimate contaminant concentrations in environmental media that are considered protective of humans, including sensitive groups, over a lifetime. DOE and the regulatory agencies have agreed that interim ground water cleanup standards will meet Maximum Contaminant Levels for remediation performed under the Interim Record of Decision. The Final Site-Wide Record of Decision Final will establish the final cleanup standards for ground water.*

#### **NRRB Recommendation 6:**

Materials presented to the board state that DOE used a 5 percent discount rate for preparing its cost estimates, and cite EPA's "Remedial Action Costing Procedures Manual" (EPA/600/8-87/049; see page 3-1). However, EPA issued guidance in June of 1993 which revised the recommended discount rate to 7 percent (see OSWER Directive 9355, 3-20, OMB circular A-94 (October 29, 1992)). DOE should use this more current 7 percent rate when calculating its "net present value" cost estimates for site decision documents.

**DOE Response:**

*During the preparation of the Site-Wide Feasibility Study in 1998-1999, DOE understood the discount rate in estimating present-worth costs to be 5 percent. DOE presented these cost estimates to the public in the Site-Wide Feasibility Study, the Site-Wide Proposed Plan, and the Draft Interim Site-Wide Record of Decision documents for LLNL Site 300. Rather than create inconsistencies between these documents by presenting a second set of present-worth cost estimates using a 7 percent discount rate, DOE has elected to include only the cost estimates using a 5 percent discount rate in the Draft Final and Final Interim Record of Decision documents.*

*Informally, DOE has compared the effect of using a 5 percent versus a 7 percent discount rate on the estimated present-worth costs of the selected remedies. Using a 7 percent discount rate lowers the estimated total 30-year costs between 13 percent and 19 percent, depending on the specific remedy. The primary use of these cost estimates is to compare remedial alternatives, and DOE considers the accuracy of the estimates using a 5 percent discount rate to be acceptable for planning purposes.*